West Coast Regional Carbon Sequestration Partnership

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RESEARCH OBJECTIVES

The goal of the West Coast Regional Carbon Sequestration Partnership (WESTCARB) is to address several key issues that impact the development of practical, commercially ready sequestration technologies. WESTCARB is one of seven partnerships established by the DOE to evaluate carbon dioxide capture, transport, and sequestration (CCS) technologies best suited for different regions of the country. WESTCARB is evaluating both terrestrial and geologic sequestration options for the region comprising Arizona, California, Nevada, Oregon, Washington, Alaska, and British Columbia.

APPROACH

WESTCARB is carrying out five major tasks: (1) collecting data to characterize major CO_2 point sources, the transportation options, and the terrestrial and geologic sinks in the region; (2) addressing key issues affecting deployment of CCS technologies; (3) conducting public outreach and education work; (4) integrating and analyzing data to develop supply curves and cost-effective sequestration options; and (5) identifying appropriate terrestrial and geologic demonstration projects in the region. WESTCARB has assembled a diverse consortium of nearly 50 participants, including state natural resource, environmental protection, and other agencies; national labs and universities; private companies working on CO_2 capture, transportation, and storage technologies; nonprofit organizations; commercial users of CO_2, such as the oil and gas industry; policy/governance coordinating organizations; and others.

ACCOMPLISHMENTS

Data on 81 major point sources, which account for more than 75% of the CO_2 emissions in the region, have been compiled and organized into a geographic information system (GIS) database, which is maintained at the Utah Advanced Geographic Reference Center. The WESTCARB geologic sink GIS database contains data on the significant sedimentary basins in the region. In California, screening of 104 sedimentary basins excluded 77 on the basis of insufficient depth (<800 m), lack of seals, or lack of access. The estimate of the storage capacity of saline formations in the ten largest remaining basins ranged from 146 to 840 Gt CO_2, depending on assumptions about what fraction of the formations is used, what fraction of the pore volume is filled with separate-phase CO_2, and salinity. The amount of CO_2 that could be stored in oil reservoirs associated with EOR was found to be 3.4 Gt. If existing plants are retrofitted for capture, about 50 M tons of CO_2 per year could be sequestered for $35 per ton CO_2 avoided.

Terrestrial sequestration studies are using GIS databases to characterize the carbon baseline in the region and to develop supply curves for major classes of land use. Analysis of changes in carbon stocks in California for the decade of the 1990s revealed that forests and rangelands were responsible for a net removal of carbon dioxide from the atmosphere of 7.55 $MMTCO_2eq/yr$, and that agricultural lands were responsible for a net emission of 0.35 $MMTCO_2eq/yr$. In California, it was found that rangeland conversion yielded the greatest carbon benefits. For an afforestation project of 80 years duration, it was found that 5.6 GT of carbon could be stored at less than $50/MT C, involving an area of about 21 million acres.

Storage site permitting, monitoring, and injection regulations, as well as health, safety, and environmental (HSE) risks, are key issues affecting the deployment of geologic sequestration technologies. A screening-level risk assessment tool has been developed to help select sites with minimum HSE risk. The regulatory framework in each state has been defined as a first step in addressing regulatory issues. These issues are also being addressed through public outreach efforts.

SIGNIFICANCE OF FINDINGS

Though analyses are continuing in several WETCARB states, results to date show that significant sequestration opportunities are available in the region. In California, the Central Valley, alone, has capacity for several hundred years of CO_2 emissions from utilities. Because of its capacity, and the presence of oil and gas reservoirs, the Central Valley also is favored as a location for field pilot studies. Terrestrial sequestration opportunities have been identified in afforestation and forest fire mitigation. Though smaller in magnitude than the geologic opportunities, the terrestrial opportunities are much less expensive.

ACKNOWLEDGMENTS

This work was supported by the Assistant Secretary for Fossil Energy, Office of Coal and Power Systems, of the U. S. Department of Energy through the National Energy Technology Laboratory, under DOE Cooperative Agreement No. DE-FC26-03NT41984, and DOE Contract No. DE-AC03-76SF00098, and by the California Energy Commission through Work Authorization Contract #500-02-014, Work Authorization #MR-021, and Interagency Agreement 500-03-018.